State of California

M e m o r a n d u m

To: Robert C. Hight, Director
Department of Fish and Game

Date: April 2, 2002

From: Patricia Wolf, Regional Manager, Marine Region
Department of Fish and Game

Subject: Central California Set Gill Net Closure Post-Hearing Report

Summary

This document, required by Fish and Game Code Section 8664.7, summarizes the impacts of the central California set gill net fishery on populations of common murres and southern sea otters, discusses the alternatives to closure that the Department has considered and rejected, and responds to comments that have been received on this subject. The common murre and the southern sea otter can dive deeper than 30 fathoms, the same depths at which set gill nets currently operate. The Department concludes that these marine resources are being adversely impacted by the continuing use of gill and trammel nets, and recommends the closure of the fishery in ocean waters out to 60 fathoms from Point Reyes in Marin County to Point Arguello in Santa Barbara County.

Introduction

The following, presented for the Director's review and approval, is the Central California Set Gill Net Closure Post-Hearing Report. It reviews the condition of the local population of common murres and southern sea otters. All evidence reviewed indicates that when set gill nets are fished in areas where common murres and sea otters are foraging, the incidental take of murres and otters will occur. As a result, this Report recommends that the Director reissue an Order affecting the use of gill and trammel nets. If approved, the Order would prohibit the use of gill and trammel nets year-round in ocean waters which are 60 fathoms or less from Point Reyes in Marin County to Point Arguello in Santa Barbara County. Additionally, the Report considers the alternatives to closure and provides responses to pertinent comments received on the closure process. Enclosed with this Report is an "Assessment of Seabird and Marine Mammal Impacts by the Central Coast Set Gill Net Fishery," which was prepared by Department staff to document the more detailed aspects of this issue.

CENTRAL CALIFORNIA SET GILL NET CLOSURE POST-HEARING REPORT

Background

The bycatch of seabirds and marine mammals in the California set gill net fishery has been recognized since the early 1980s. All evidence indicates that when set gill nets are fished in areas where common murres and sea otters are foraging, the incidental take of murres and otters will occur. The present issue arose from the confluence of three separate events in spring 2000:

- First, by letter dated April 27, 2000, the Department received a 60-Day Notice of Intent to Sue on behalf of the Center for Biological Diversity, which alleged that the State's regulation of the central California halibut set gill net fishery had resulted in unacceptable bycatch, including common murres and sea otters;

- Second, the common murre population in central California has been the subject of a major restoration effort from the aftermath of the 1986 *Apex Houston* oil spill. As a result of the ongoing monitoring, Department staff concluded that the annual drowning of an estimated 3,000 birds in Monterey Bay by the halibut set gill net fishery was significant enough to adversely impact the Devil's Slide and Castle Rock/Hurricane Point colonies, as well as cause identifiable long-term impacts to the Farallones and Point Reyes colonies; and

- Third, biennial surveys of the southern sea otter conducted by the U.S. Geological Survey (USGS), in cooperation with the Department, indicated that the otter's range had expanded into the area between Point Sal and Point Arguello in 1995.

On August 8, 2000, the Department met with affected fishermen at Monterey to discuss the situation. On September 8, 2000, Department staff issued a "Biological Opinion" concerning set gill net impacts to murres and sea otters (subsequently renamed "Assessment" to more accurately reflect its function). On September 11, 2000, the Director issued an Order pursuant to Fish and Game Code Section 8664.5, prohibiting the use of gill or trammel nets in ocean waters 60 fathoms or less from Point Reyes to Yankee Point, and from Point Sal to Point Arguello. On the same day, the Department adopted an emergency regulation that implemented the Order. On September 18, 2000, the Department held a hearing to take testimony to determine whether any modification of the Order was necessary. On October 16, 2000, a hearing was held with affected fishermen from Morro Bay who did not attend the September 18 hearing. The Order expired on January 9, 2001, but the underlying emergency regulation was readopted on January 10,

2001, to allow further consideration of whether the set gill net restrictions should be modified. Department staff reviewed data on common murre distribution, and the data indicated that common murres were present in the area. Department staff concluded that another closure was indicated, from Yankee Point to Point Sal, to preempt increased adverse impacts to seabirds and marine mammals due to re-directed fishing activity from the original two closure areas. On May 8 and 9, 2001, the Department held hearings in Seaside and San Luis Obispo, respectively. On April 23, 2001, a proposed permanent rulemaking was filed with the Office of Administrative Law that encompassed all three closure areas. However, on May 23, 2001 the Department discovered that the Notice of Proposed Action and the text of the regulations had not been mailed to the fishermen and to other interested parties. If the Director accepts the recommendations contained in this Report and issues a new closure Order, the Department will re-initiate the rulemaking process.

Summary of Population Impacts

Common murre breeding colonies of central California range from Point Reyes to Point Sur and non-breeding birds range into southern California. Murres can dive to almost 98 fathoms (180 meters, or 590 feet) (Piatt and Nettleship 1985). The population is estimated to be between 7 and 22 percent of its historic level, based on estimates (Carter et al. 2001) that the South Farallon Island colony alone numbered between 1 and 3 million birds in the early 1800s. Although the common murre is subject to various restoration and management actions, set gill net entanglements continue to exacerbate the serious impediments to restoration faced by this species. The common murre is listed under the Migratory Bird Treaty Act, and is additionally protected under Fish and Game Code Section 3513.

The southern sea otter ranges from Half Moon Bay in San Mateo County to just below Point Conception in Santa Barbara County and can dive to 36 fathoms. The southern sea otter population is currently static, and although it is the subject of state and federal protection, set gill net entanglements continue to exacerbate the serious impediments to recovery faced by this species.

Point Reyes to Yankee Point, waters 30 - 60 fathoms. This area was included in the September 11, 2000 Order because it encompasses the majority of the central California breeding colonies of common murres and their associated foraging areas. This includes preliminary estimates from 2000 of 165,373 birds at the Farallon Islands, 36,202 at Point Reyes, and 196 birds at Devil's Slide Rock on the San Mateo County Coast (M. W. Parker, U.S. Fish and Wildlife Service (USFWS), unpublished data). The Devil's Slide Rock colony is the site of the *Apex Houston* oil spill Common Murre Restoration Project. This area also includes inshore areas of Monterey Bay, where it is estimated that one-third to one-half of the central California population of common murres disperses in late summer and

early fall. During this period, adult male birds escort and feed the dependent young. Thus, if an adult male is killed due to entanglement in a set gill net, the chick is likely to die as well. Set gill net fishing occurs in this area and bycatch of common murres has been documented. Approximately 28 percent of the southern sea otter population occurred in this area when the sea otter spring survey in 2001 counted 601 individuals between point Reyes and Yankee Point (B. B. Hatfield, USGS, unpublished report). In the south Monterey Bay area, between March 1999 and January 2000, the number of otters observed in deep water (30-50 fathoms) ranged from zero to 13. Otters that are foraging at these depths are vulnerable to entanglement and drowning in set gill nets. A National Marine Fisheries Service (NMFS) at-sea observer program documented the bycatch of a sea otter in a net set at 31 fathoms in the Monterey Bay area (Forney et al. 2001).

Yankee Point to Point Sal, waters 30 - 60 fathoms. This area was not included in the September 11, 2000 Order, but is now being recommended for inclusion by Department staff. The area encompasses the southernmost breeding colony of common murres on the west coast and their associated foraging areas. In 2000, a preliminary estimate in Monterey County showed 2,643 birds nesting near Point Sur at the Castle Rock/Hurricane Point complex (M. W. Parker, USFWS, unpublished data). The small size of this colony makes it highly susceptible to declines due to increased mortality from human impacts. Nearshore waters in this area are also potential foraging and chick rearing areas for common murres from the other central California colonies. Approximately 68 percent of the southern sea otter population occurred in this area when the sea otter spring survey in 2001 counted 1,486 individuals between Yankee Point and Point Sal. An assessment of mortality in the set gill net fishery estimated that approximately 80 sea otters per year were drowned during the 3-year period from 1982 through 1984 in the Monterey, Morro Bay and Avila/Port San Luis areas combined (Wendell et al. 1986).

Point Sal to Point Arguello, waters 0 - 60 fathoms. This area was included in the September 11, 2000 Order because it encompasses foraging areas for the central California breeding colonies of common murres, particularly the Castle Rock/Hurricane Point colony complex off Big Sur. Common murres have been documented in the waters off Point Sal and were the most impacted species of seabird in the area from the 1997 *Torch/Platform Irene* pipeline oil spill (Ford Consulting Company 1998). A natural resource damage settlement is in the negotiation process, and a seabird restoration project has been proposed in this area. Approximately 1 percent of the southern sea otter population occurred in this area when the sea otter spring survey in 2001 counted 22 individuals between Point Sal and Point Arguello. In 1995, sea otters expanded their range into this area where there are currently no set gill net fishery depth restrictions. Between 1995 and 2001, sea otter counts south of Point Sal ranged from 12 (Spring 1996)

to 187 (Fall 1998), with an average of 39.

Discussion of Alternatives

On August 8, 2000, the Department met with commercial set gill and trammel net fishermen and other interested individuals to solicit solutions to the seabird and marine mammal mortality problem. In addition to expressing concern for the data being used to estimate mortality of entangled seabirds (see below), fishermen's solutions included: (1) a buy-out program by the State ($300,000 - $400,000 per vessel); (2) construction of an experimental net with small mesh in the upper one half of the net that they felt would not catch birds; (3) re-issuance of otter trawl permits for the nearshore waters per the conditions attached to an option provided to the Fish and Game Commission at the conclusion of the Alternative Gear Development Program in 1989 (for information on the Alternative Gear Development Program see the Assessment of Seabird and Marine Mammal Impacts by the Central California Set Gill Net Fishery, Section 3.1); and, (4) conducting an observer program in the Morro Bay and Avila/Port San Luis areas to further establish seabird and marine mammal entanglement rates.

As to the first alternative, the Department has stated on several occasions that the idea of buy-outs or other compensation to fishermen to cease fishing has significant statewide policy, program and legal ramifications. Under the set gill net closures enacted by the Marine Resources Protection Act of 1990, the southern California gill netters who reaped profits from post-1990 gill netting operations were required to contribute to a fund the primary purpose of which was to ease the burden of the eventual ban on gill netting, while other commercial fishermen and recreational fishermen were compelled to contribute toward helping those whose gear became obsolete.[1] There is no similar authorization for a fund to compensate for the closure as a result of this action. Such authorization would have to come from the California Legislature. Such an action would require policy direction from the Legislature, together with a special appropriation.

As to the second alternative, fishermen believe that a set gill net constructed with small meshes (2 to 2.5 inch) in the top half of the net will not entangle seabirds. However, small mesh nets, formerly used off central California to take white croaker and constructed of 2 to 3 inch mesh, were fished during daylight hours only. White croaker nets were 500 to 1500 fathoms (3000 to 9000 feet) in length (longer than halibut nets). These small mesh white croaker nets caught seabirds in the study area from the Sonoma-Mendocino County line south to Yankee Point, Monterey County, at the rate of 5.6 birds per observed net set. Few

[1] **California Gill netters Association v. Department of Fish and Game (1995) 39 Cal.App.4th 1145, 1157.**

of the 159 total white croaker net sets were observed in the Monterey area (total of 9 sets and 13 seabirds observed in the Monterey area). However, it is clear that these small meshes will capture common murres where they encounter the nets. The total number of seabirds observed in small mesh white croaker nets for the larger study area was 888 for the 1983 - 1986 period. The available data suggest that a new net design that relies on small mesh at the top of the net is not a viable solution to the seabird entanglement problem. That is, given the rate of seabird entanglements in the former small mesh white croaker nets, there is little information available at this time to conclude that the proposed experimental net design would not entangle seabirds that come into contact with the net. In addition, the rate of entanglement in the white croaker nets does not appear to be different than the larger mesh set gill nets used in the halibut fishery. Also, the smaller mesh net could potentially increase bycatch of other finfish species such as groundfish which are already severely impacted.

As to the third alternative, the use of otter trawls is statutorily precluded by Fish and Game Code Section 8606.1. That section required that all nearshore trawl nets be phased out by 1993, and can only be changed by legislation; therefore, the Department has no power to grant what the fishermen request.

The last suggestion was to consider an observation program to further establish seabird/sea otter mortality rates for the Morro Bay area. However, this would be unlikely to result in evidence that would change the proposed gear restriction in light of the vulnerability of the southernmost common murre colonies to even low net entanglement rates. The assessments clearly indicate that if nets are allowed in areas of foraging seabirds and otters, these animals will be drowned. This alternative is further discussed in the comment section below.

Responses to Public Comments

In 2001, the Department held hearings required by Fish and Game Code Section 8664.7 at Seaside (May 8) and San Luis Obispo (May 9). Some of the comments received are not relevant to the subject of this Report, although responses to all comments will be prepared and entered into the administrative record, should the Director elect to proceed with a permanent rulemaking. For purposes of this Report, relevant comments concern the informational basis on which the finding of adverse impacts was based. In bold below is a paraphrase of the comment(s) received, followed by the Department's response.

Comments criticized the Department for protecting seabirds and marine mammals to the detriment of human beings.

The Department does not make its recommendations lightly and fully

appreciates the economic impact such decisions may have on individuals. However, the Department's duties are delineated by the acts of the Legislature, which has stated that California's fishery resources are held in trust by the Department on behalf of all the citizens (Fish and Game Code Sections 711.7(a), 1802). The Legislature has also identified seabirds and sea otters as marine resources worthy of protection. Through Section 8664.5, the Legislature has provided a mechanism for determining when adverse impacts to these marine resources justify closure of the central California set gill net fishery. In that respect, it is important to note that the California Supreme Court has declared that the power to regulate fishing has always existed as an aspect of the inherent power of the Legislature to regulate the terms under which a public resource may be taken by private citizens.[1]

Comments asserted that seabirds were abundant, suggesting that local populations could not, therefore, be so adversely impacted as to justify a closure.

The central California common murre population is estimated to be between 7 and 22 percent of its historic level. Despite the murre being the subject of various restoration and management actions, set gill net entanglements continue to exacerbate the serious impediments to restoration faced by this species.

Many species of seabirds superficially resemble each other. Numerous species of seabirds forage along the central California coast. With respect to set gill nets, the Department is concerned about all diving seabirds but in particular the common murre, which can dive to 98 fathoms when foraging. The set gill net fishery is targeting halibut and white seabass that are pursuing the same bait fish as the murres. The fishermen indicated they set their nets specifically where the bait fish schools are, which is also where the birds dive to forage. Thus, while many seabirds may be seen on the surface, murres and other diving seabirds are particularly impacted by this fishery. The local population of common murres is particularly susceptible to oil spills and entanglement in set gill nets. The common murre is listed under the Migratory Bird Treaty Act, and is additionally protected under Fish and Game Code Section 3513. The success of the restoration efforts for the central California common murre population has been impeded by the ongoing mortality caused by set gill nets.

Comments questioned the validity of the data used to estimate mortality for commons murres and sea otters.

[1] **In re Phoedovius (1918) 177 Cal. 238, 245-246; People v. Monterey Fish Products Company (1925) 195 Cal. 548, 563.**

There are numerous peer reviewed papers describing the mortality of seabirds and marine mammals in set gill nets over the last 20 years. The most recent federal at-sea observation study in the Monterey Bay area (Cameron and Forney 2000, Carretta 2001) had a large sample size for both years of the study (1999 through 2000) and used estimation methods that have been reviewed and approved by numerous scientists and have been published in peer-reviewed journals (Julian and Beeson 1998). Even if the take of murres was one-tenth what the data indicated, it would still be unacceptable. The Department's updated information is documented in the accompanying "Assessment of Seabird and Marine Mammal Impacts by the Central California Set Gill Net Fishery".

Comments suggested that a finding of adverse impact requires a showing of actual injury.

Fish and Game Section 8664.5 states that the Director may issue an order prohibiting the use of gill and trammel nets if he determines that they are having an adverse impact on certain populations. Fish and Game Code Section 8664.5(e)(1) defines "adverse impact" as:

> "The danger of irreparable injury to or mortality in, any population of any species of seabird, marine mammal, or fish which is occurring at a rate that threatens the viability of the population as a direct result of the use of gill nets or trammel nets."

The Director's Order of September 11, 2000 found that common murres were subject to this definition of adverse impact. In any case, mortality of the common murres has been well documented (for additional information on common murre mortality see Assessment of Seabird and Marine Mammal Impacts by the Central California Set Gill Net Fishery, Section 2.1.2). It further defines "adverse impact" as:

> "The impairment of the recovery of a species listed as an endangered species or threatened species pursuant to the federal Endangered Species Act...or the California Endangered Species Act...or a species of seabird, marine mammal, or fish designated as fully protected under this code, as a direct result of the use of gill nets or trammel nets."

For additional evidence of the extent of the injury caused by set gill nets see Assessment of Seabird and Marine Mammal Impacts by the Central California Set Gill Net Fishery, Section 2.1.2.

The Director's Order of September 11, 2000 found that sea otters were

subject to the Fish and Game Section 8664.5(e)(1) definition of adverse impact. In determining whether the use of set gill or trammels nets directly results in the impairment of the sea otter's recovery, several considerations are evident. The southern sea otter is an appropriate subject for Section 8664.5(e)(2) because it is listed as threatened under the Endangered Species Act, is "fully protected" under State law, is depleted under the Marine Mammal Protection Act, and is the subject of a federal Southern Sea Otter Recovery Plan. Population surveys indicate that the southern sea otter's range has expanded into the subject set gill net fishery areas. Also, it is incontrovertible that when set gill nets are used where sea otters are foraging, instances of entanglement and mortality will inevitably occur. Finally, while federal law could theoretically allow for the incidental take of sea otters, no such permits have been issued, and, in any case, the stricter Section 4700 allows for no take under any circumstances. Taking these considerations together, the Director may reasonably conclude that, as a direct result of the use of set gill nets, the recovery of the southern sea otter will be impaired. For additional evidence of the extent of the injury caused by set gill nets see Assessment of Seabird and Marine Mammal Impacts by the Central California Set Gill Net Fishery, Section 2.2.2.

Comments criticized the Department that it failed to adequately consider gear innovations.

On the contrary, alternative gear types have been carefully evaluated over the years. From 1986 through 1988 the Department conducted an Alternative Gear Development Program in Central California to investigate alternative gear types for the take of California halibut and white croaker (Haseltine and Thornton 1990). The study was conducted from 1986 through 1988 in central California. Gear tested for the take of halibut were otter trawl, Scottish seine, pair trawl, beam trawl, traps, bottom longline, and troll gear (Haseltine and Thornton 1990). All tested gear types did not appear to seriously threaten seabird or marine mammal populations. Only otter trawls caught halibut at a rate economically approaching or exceeding gill and trammel nets. No new alternative gear types have been suggested that appear to have any likelihood of success of dramatically reducing bycatch without causing new problems. The otter trawl is illegal and the smaller mesh size idea will still catch birds and cause a new bycatch problem for nearshore finfish.

Comments claimed the Department ignored a Washington Sea Grant Program study. The study involved gear modifications to the Puget Sound drift gill net fishery and related strategies to reduce seabird bycatch. Comments also claimed that the Department failed to consider the applicability of acoustically "visible" gills nets that were experimented with in Atlantic fisheries to reduce bycatch of harbor porpoises.

As to the Puget Sound study, the new gear resulted in a reduction of seabird bycatch of 70 to 75 percent. While impressive, the precarious status of the common murre's recovery in central California makes even an annual mortality of 1,250 (one quarter of the numbers indicated in the most recent observer program) unacceptable. This species has experienced a declining population in central California in the past decades to a level that is estimated to be between 7 and 22 percent of its historical level. While many factors have contributed to this decline, the small colonies located close to the current set gill net areas (Devil's Slide Rock and Big Sur) could experience significant declines if a large percentage of the annual bycatch mortality consists of individuals from these breeding sites. As to acoustically visible set gill nets, the Department notes that such nets would, like pingers, be ineffective because sea otters do not rely on echolocation the way porpoises do. (See previous response for more information on gear innovations.)

Comments claimed that the Department rejected out of hand an offer by affected fishermen in the Morro Bay area for a paid observer program to document the rate of take of seabirds and sea otters.

Based on the facts that the Department knows, these nets catch murres and sea otters if the nets are used where these animals forage; bycatch is certain, and a new costly observer program would not tell the Department anything that it does not already know. From 1980 to 1989, 5,271 seabirds were observed caught in set gill nets in the area from the Sonoma-Mendocino County line south to Yankee Point (Wild 1990). Common murres accounted for 50 to 97 percent of the total seabird fishery mortality from 1980 to 1986, and at least 70,000 common murres were drowned in large and small mesh gill and trammel nets between 1979 and 1987 (Takekawa et al. 1990). From July 1990 to December 1994, a total of 880 common murre were observed entangled, 99 percent north of Point Conception and predominantly in the Monterey area (Julian and Beeson 1998). The NMFS estimated that a total of 7,964 common murres were drowned in large and small mesh gill and trammel nets during that period (Julian and Beeson 1998). From 1995 to 1998, no observer program existed for this fishery, but Forney et al. (2001) statistically estimated the range of total murre mortality for this period to be 5,918 to 13,060 birds. In 1999, a reinstated NMFS observer program in Monterey Bay covered 23 percent of fishing trips and observed 498 dead common murres, resulting in a statistically-based mortality estimate of 2,359 murres for the period of January through December 1999 (Cameron and Forney 2000). In addition, approximately 560 dependent chicks are likely to have died as a result of the death of the male parent (NMFS, unpublished data, K. A. Forney pers. comm.). In 2000, the NMFS observer program in Monterey Bay covered 27 percent of the fishing trips and observed 711 dead common murres, resulting in a statistically-based mortality estimate of 3,141 murres for the period of January through August 2000 (Carretta 2001). Wendell et al (1986) estimated annual mortality of sea otters in

the set gill net fishery over the period from June 1982 through June 1984, at 80 otters per year. Herrick and Hanan (1988) estimated the incidental take of sea otters from 1973 to 1983 to be from 48 to 166 otters annually, with an average of 103 mortalities per year. Based on historical data and annual estimates of 1995 through 1998 fishing effort, Forney et al. (2001) statistically estimated the range of sea otter mortality for this period to be 17 to 125 individuals depending on the assumptions made. In 1999 and 2000, a NMFS observer program of the set gill net fishery in the Monterey Bay area documented the incidental take of one sea otter in a net set at 31 fathoms (Forney et al. 2001).

Recommendation

The Department believes that, as a direct result of the use of gill and trammels nets, (1) there is a danger of irreparable injury to or mortality in common murres which is occurring at a rate that threatens the viability of the central California population, and (2) the recovery of the southern sea otter is impaired. The Department recommends that the Director reissue the enclosed Order that, year-round, gill or trammel nets may not be used in ocean waters which are 60 fathoms or less in depth at mean lower low water, in the areas from Point Reyes to Point Arguello.[1]

Enclosure(s)

[1] **By way of clarification, the description of the closure area contained in the Order and the regulation reference the compass designations "true" and "magnetic" in a particular manner that was required to conform to action with existing closure boundaries (Fish and Game Code Sections 8664.8(a), 8610.2(d)(2), 8610.3(b)).**

Literature Cited

Cameron, G. A. and K. A. Forney. 2000. Preliminary Estimates of Cetacean Mortality in California/Oregon Gillnet Fisheries for 1999. Paper SC/S2/O24 presented to the International Whaling Commission, 2000 (unpublished). 12p. Available from NMFS, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, California, 92038, USA.

Carretta, J. V. 2001. Preliminary estimates of cetacean mortality in California gillnet fisheries for 2000. Paper SC/53/SM9 presented to the International Whaling Commission, 2001 (unpublished). 21 p. Available from NMFS, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, California, 92038, USA.

Carter, H. R., U. W. Wilson, R. W. Lowe, M. S. Rodway, D. A. Manuwal, J. E. Takekawa, and J. L. Yee. 2001. Population trends of the common murre (Uria aalge californica). Pages 33 - 128 *in* D. A. Manuwal, H. R. Carter, T. S. Zimmerman, and D. L. Orthmeyer, editors. Biology and conservation of the common murre in California, Oregon, Washington, and British Columbia. Volume 1: Natural history and population trends. U.S. Geological Survey, Biological Resources Division, Information and Technology Report USDS/BRD/ITR2000-0012, Washington, D.C.

Ford Consulting Company. 1998. Preliminary bird injury assessment for the Torch/Platform Irene pipeline oil spill, September 1997. Prepared for Office of Spill Prevention and Response, California Department of Fish and Game. Portland, Oregon.

Forney, K. A., S. R. Benson, and G. A. Cameron. 2001. Central California Gill Net Effort and Bycatch of Sensitive Species, 1990-1998. Pages 141-160 *in* Seabird Bycatch: Trends, Roadblocks, and Solutions, Edward F. Melvin and Julia K. Parrish, editors. Proceedings of an International Symposium of the Pacific Seabird Group, University of Alaska Sea Grant, Fairbanks, Alaska. 212 pp.

Haseltine, A. W. and S. Thornton. 1990. Alternative gear development off central California *in*: The California Halibut, *Paralichthys californicus*, Resource and Fisheries. p. . Ed. by C. W. Haugen. Calif. Dept. Fish and Game, Fish Bulletin 174, pp. 341-358.

Herrick, S. F. Jr. and D. Hanan, 1988. A review of California entangling net fisheries, 1981-1986. National Oceanographic and Atmospheric Administration Technical Memorandum National marine Fisheries Service

NOAA-TM-NMFS-SWFC-108. 39 pp.

Julian F., and Beeson, M. 1998. Estimates of Marine Mammal, Turtle, and Seabird Mortality for two California Gill-Net Fisheries: 1990-95. Fishery Bulletin 96: 271-284.

Piatt, J. F. and D. N. Nettleship. 1985. Diving depths of four alcids. Auk 102:293-297.

Takekawa, J. E., H. R. Carter, and T. E. Harvey. 1990. Decline of the Common Murre in Central California, 1980–1986. Pages 149–163 *in* S.G. Sealy, editor. Auks at Sea. Studies in Avian Biology 14.

Wendell, F. E., R.A. Hardy, and J. A. Ames. 1986. An assessment of the accidental take of sea otters, *Enhydra lutris*, in gill and trammel nets. Calif. Dept. Fish and Game, Mar. Res. Tech. Rep. No. 54, 31 pp.

Wild, P. W. 1990. The Central California experience: a case history of California Halibut set net laws and regulations. *In*: The California Halibut, *Paralichthys californicus*, Resource and Fisheries. Ed. by C. W. Haugen. Calif. Dept. Fish and Game, Fish Bulletin 174, pp. 321-339.